CLAIMS PENDING IN APPLICATION SERIAL NO. 09/686,880
as of May 24, 2001

1. A method for generating a culture that is purified or enriched in respect of cells of a selected lineage, comprising:-

(i) introducing into a multipotential cell a selectable marker that is differentially expressed in cells of the selected lineage compared with its expression in other cells, wherein cells of the selected linage constitute a sub-set of the cells obtainable from the multipotential cell;

(ii) culturing the multipotential cell *in vitro* to induce differentiation of the multipotential cell into a cell of the selected lineage or into a mixture of cells including cells of the selected lineage, or to induce preferential survival, in a mixed culture of cells, of cells of the selected lineage; and

(iii) selecting for cells of the selected lineage according to differential expression of the selectable marker introduced in step (i).

2. A method according to Claim 1 for generating a culture that is enriched or purified in respect of progenitor cells of a selected lineage.

3. A method according to Claim 1 wherein the multipotential cell is selected from embryonic stem (ES) cells, embryonic germ (EG) cells, embryonic carcinoma (EC) cells, a primary culture of foetal cells, a primary culture of post-natal cells, and a primary culture of adult cells.

4. A method according to Claim 1 comprising genetically modifying multipotential cells to delete, mutate, substitute or add genes in order (i) to assay gene function in progenitor cells of the selected lineage, and/or (ii) to render selected cells more suitable for transplantation.

5. A method according to any of Claim 1 further comprising:-

(iv) introducing into the multipotential cell a second selectable marker that is differentially expressed in cells of a selected sub-lineage compared with its expression in other cells, wherein cells of the selected sub-lineage are formed by differentiation of cells of the selected progenitor lineage; and

(v) when a culture of progenitor cells of the selected lineage has been obtained, allowing or inducing differentiation of the cells and selecting for cells that express the second selectable marker.

6. A method according to any of Claim 1 wherein the selectable marker is introduced into the multipotential cell by targeted integration or random gene trap integration so as to be operatively coupled to a gene that is differentially expressed in progenitor cells of the selected lineage.

7. A method according to any of Claim 1 wherein the selectable marker is introduced into the multipotential cell via random integration of a transgene in which the selectable marker is operatively coupled to a gene that is differentially expressed in progenitor cells of the selected lineage.

8. A method according to any of Claim 1 wherein the multipotential cell is an ES, EG or EC cell and the method comprises forming an embryoid body, or otherwise inducing differentiation of the cells.

9. A method according to Claim 8 wherein the differentiated cells are dissociated so as to form a culture substantially of individual cells.

10. A method according to Claim 8 wherein differentiated cells of an embryoid body are dissociated using a protease, such as trypsin.

11. A method according to Claim 1, for generating a culture that is purified or enriched in respect of neural progenitors, comprising introducing into the multipotential cell a selectable marker that is differentially expressed in neural progenitor cells.

12. A method according to Claim 11 wherein the selectable marker is expressed in cells that express a Sox gene.

13. A method according to Claim 12 wherein the Sox gene is selected from Sox 1, Sox 2 and Sox 3.

14. A method according to Claim 1 for generation of cardiac progenitor cells, wherein the selectable marker is expressed in cells that express the Nkx 2.5 or GATA-4 gene.

15. A method according to Claim 1 for generating a culture that is purified on enriched in respect of haematopoietic progenitors.

16. A method according to Claim 15 wherein the selectable marker is expressed in cells that express CD34, CD44 or SCL.

17. A method according to Claim 1 wherein the selectable marker is an antibiotic resistance gene and the method comprises culture in the presence of antibiotic.

18. A method according to Claim 5, for obtaining a culture that is purified or enriched in respect of ventral progenitor cells, wherein the selectable marker is differentially expressed in neural progenitor cells and the second selectable marker is differentially expressed in ventral progenitor cells.

19. A method according to Claim 18 wherein the second selectable marker is differentially expressed in cells that express Pax 6.

20. An assay of the effect of a factor on a culture of progenitor cells of a selected lineage, comprising:-

A (i) introducing into a multipotential cell a selectable marker that is differentially expressed in progenitor cells of the selected lineage compared with its expression in other cells, wherein progenitor cells of the selected lineage constitute a sub-set of the cells obtainable from the multipotential cell;

(ii) culturing the multipotential cell *in vitro* to induce differentiation of the multipotential cell into a cell of the selected lineage or into a mixture of cells including cells of the selected lineage, or to induce preferential survival, in a mixed culture of cells, of cells of the selected lineage; and

(iii) selecting for progenitor cells of the selected lineage according to differential expression of the selectable marker introduced in step (i), and

B culturing the thereby obtained progenitor cells of selected lineage in the presence of the factor.

22. A method according to Claim 20 to assay whether the factor has a proliferative, maturation, toxic or protective effect on progenitor cells of the selected lineage.

23. A method according to Claim 22 to assay whether a factor has a proliferative, maturation, cytotoxic or glial protective effect on neural progenitor cells.

24. A method of preparing a neural progenitor cell or a differentiated progeny thereof for storage, comprising obtaining the cell in a method according to Claim 1 and freezing the cell in the presence of a cryoprotectant.

25. A method of generating purified neurons, comprising obtaining a culture purified in respect of neural progenitors, using the method of Claim 1 wherein the selectable marker is differentially expressed in cells that express a Sox gene, and

culturing the progenitors obtained in the presence of medium suitable for differentiation of the progenitor into neurons.